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BRAKE TORQUE ANALYSIS OF FULLY MECHANICAL PARKING BRAKE SYSTEM: THEORETICAL AND EXPERIMENTAL APPROACH

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Abstract: The effect of the drum brake temperature reduction on the clamping force of the parking brake system has not been well addressed despite the fact that it may result in vehicle roll away. In view to this, a parking brake model that takes into account the temperature reduction of the drum brake has to be developed and more importantly, it must comply with the applicable standards or regulations such as Federal Motor Vehicle Safety Standard (FMVSS) 135. This paper develops a one dimensional (1D) model of leading-trailing drum-type parking brake model. This brake model is then verified with experiments carried out on a test bench that has been verified with the hand brake system in the vehicle. The results from the experiments show a good correlation with the predicted results from the brake model. It is also found that the existing parking brake design meets the standard requirements. Another finding is that the brake torque slightly increases as the drum temperature increases. With the verified brake model, parametric studies can be carried out as one of the tools during the design process. From the studies, it is found that rollaway will not happen even with the maximum vehicle weight and friction coefficient at drum/lining interface above 0.2.

Key Words: Parking brake model, Torque, Drum brake, Temperature, Rollaway

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